ATTACHEMENT COMPRISING A FLEXIBLE CORD

This invention relates to attachments, in particular, although not exclusively, for attachment of a price tag, swing tag or security label to fabric or other articles.

Known attachments take the form of an elongate plastics filament having an integrally formed transverse cross-bar at one end, forming a T-shape with the filament, and an integrally formed paddle at the other. The attachment is typically used to secure a label or tag to a fabric article, clothing for example or a soft toy, the T-shaped end of the attachment being passed through a hole on the label or tag and the fabric, so that the filament extends through both. The paddle serves to prevent the label or tag from sliding off the other end of the filament. It is also known to secure such attachments to articles by passing the cross-bar through a pre-formed opening in the article, for example one of the lacing holes in a shoe or an opening formed specifically for the attachment.

The attachments are provided in an array, formed on a spine, to which their T-shaped ends are joined and are applied using a tagging gun. The tagging gun is adapted to receive the spine and the attachments it carries, and to 'fire' individual attachments, T-shaped end first,

through the hole in the label or tag and the fabric, to secure one to the other.

Variations of these attachments are known in which the paddle is replaced by a hook by which the article can be suspended from a display, or an eye which might be used, for example, for the suspension of a further article. It is also known to provide cross-bars at both ends of the filament, especially when attaching two fabric articles together.

Another variation is for the paddle to be replaced with a snap-fit connector which allows connection of the attachment to a great variety of objects. All that is needed is that the object have a suitable formation with which the snap-fit connector on the filament can mate. Usually the snap-fit connector on the filament is in the form of a male connecting formation which can engage and be retained in a cooperating female formation of an object to which it is to be connected. Typically the snap-fit connector allows for connection of the attachment to a solid plastic label, which may bear a logo or trademark for example a fashion label. Advantageously the object can be connected to the attachment after the attachment itself has been "fired" into the fabric.

The above described attachments have an unattractive hard, synthetic appearance which can be off-putting to customers. When the attachment is

attached to fabric, especially clothing; the plastic filament and paddle or other terminal member often stick out at an odd angle. Not only is this unaesthetic, it can also cause difficulties if tagged fabric articles are stacked for storage as the attachments can scratch and potentially damage adjacent articles. Furthermore when a customer in a shop tries on an item of clothing tagged with one of the attachments, the attachment can often cause discomfort and create a negative impression of the clothing.

Consequently many retailers have started using attachments in which a cotton loop is tied around a label and attached to clothing with a safety pin. However these attachments, although aesthetically pleasing, are time consuming as they have to be fixed to the clothing by hand.

Accordingly, a first aspect of the present invention provides an attachment comprising a length of flexible cord fixed to a plastic cross-bar or T-shaped member at one end and a terminal member at the other end.

The cord is preferably in the form of a string formed from several fibre strands which have been twisted together.

The cord may be formed of rayon, cotton, hemp, elastic or any other suitable material. Preferably the cord is formed of a different material to the plastic

cross-bar or T-shaped member. The cord may be formed of a natural material. If the cord is made of a man-made material then it is preferably formed of a material which has a higher melting point than the plastic cross-bar and terminal member of the attachment; this enables the cross-bar (or T-shaped member) and terminal member to be moulded around the cord.

The flexible cord has several advantages over the elongate plastic filament used in prior art attachments. The cord is softer than a plastic filament and this causes less discomfort to a customer trying on the clothing. It also has a superior appearance and its colour and texture can easily be matched to the fabric article to which the attachment is applied. The cord is more flexible than a plastic filament and is generally "limp", that is it does not have a resilient tendency to return to an initial position; it therefore lies more naturally with an article to which it is applied. For example a label supported by an attachment having a flexible cord will hang more naturally than an attachment having a plastic filament. Furthermore an attachment having a cord is less likely to cause irritation to a customer trying on a garment bearing the attachment, especially if the cord has low resilience and/or high flexibility and/or is composed of a soft material.

Preferably the cord is formed of a material which is more flexible and/or softer than the material of the plastic cross bar to which it is fixed.

The terminal member is preferably made of plastic. It may be a paddle, ball or other configuration which serves to prevent a label or tag from sliding off the end of the cord. Alternatively it could be a hook by which the attachment and article to which it is attached may be suspended, or an eye which could be threaded onto a support member of a display, a second cross bar or T-shaped member so that the attachment can be used to attach two fabric articles together, or a snap-fit connector, as described above.

Preferably the cord is fixed to the cross-bar or T-shaped member by moulding of the cross-bar or T-shaped member around the cord. This provides a neat, strong connection between the cross-bar or T-shaped member and the cord. The cord does not need to extend all the way through and generally extends only part way into the cross-bar or T-shaped member. Preferably the cord does not extend as far as the cross part (i.e. the junction between the bars of the cross-bar or down and cross stroke of the "T") of the cross-bar or T-shaped member. Preferably one end of the cross-bar (or the end of the down stroke of the T-shaped member) is provided with an enlarged flange and it is this enlarged flange, but not the rest of the cross-bar or T-shaped member, which is

moulded around the cord. The enlarged flange may have any shape, for example, it may be cylindrical or spherical. In many cases the cord will have a larger cross sectional area than cross-bar or T-shaped member, but a smaller cross sectional area than the enlarged flange. However, if the cord has a small enough cross-sectional area it may pass all the way through the cross-bar or T-shaped member and out the other end (if this is the case then the enlarged flange is unnecessary).

Preferably the terminal member is similarly moulded around the cord. The cord may extend all the way through or only partially into the terminal member.

According to a second aspect of the invention there is provided an assembly comprising a plurality of attachments according to the first aspect of the invention, and a spine wherein the cross-bar or T-shaped member of each attachment is releasably attached to said spine such that, in use, each attachment is independently severable from said spine by means of a tagging gun.

This allows the attachments to be attached to articles, such as clothing, by use of a conventional tagging gun.

Preferably intermediate teeth are provided on the spine in between the attachments. This aids operation of the tagging gun.

The second aspect of the invention may include any of the above mentioned features of the first aspect of the invention.

A third aspect of the present invention provides a method of making a plurality of attachments according to the first aspect of the invention, the method comprising the following steps:-

a) providing a mould with a recess for moulding a cross-bar or T-shaped member and recess for moulding the terminal member

b) placing a flexible cord in the mould so that it passes between, and at least partially into both said recesses

c) injecting liquid plastic into the mould recesses and allowing it to solidify, so as to form a plastic terminal member and a plastic cross-bar or T-shaped member in the appropriate recesses around the portions of the cord in those recesses so that the terminal member and cross-bar or T-shaped member are fixed to the cord.

Preferably the cross-bar or T-shaped member recess is shaped to form a cross-bar or T-shaped member with an enlarged flange and in step b) the cord is placed so that it extends into the flange forming portion of said recess but not further into said recess. Generally the cord will have a cross sectional area such that it can fit into the enlarged flange portion of the recess, but

not into the rest of the recess which has a smaller cross sectional area.

Surplus cord may then be cut off.

Preferably the cord is cut at or just below the terminal member or cross bar/T-member so as to separate the rest of the cord from the attachment formed by the cross-bar or T-shaped member, terminal member and length of cord therebetween. The rest of the cord may then be drawn through the mould so as to put it in the position described in step b) so that a new attachment can be formed; step c) can then be repeated and so on, so as to make a plurality of attachments.

Preferably the step of drawing the cord through the mould into a position for forming a new attachment is carried out prior to the step of cutting off the previously formed attachment.

Preferably the mould is in at least two parts and is opened after step c) so as to allow drawing of the cord and attachment through the mould into position for forming a new attachment.

In some embodiments, the mould has more than two parts so that parts of the mould can be closed to clamp the cord into position, while parts of the mould remain open to allow the cord to be cut prior to moulding the new attachment. In these embodiments, preferably the cord is cut at the point at which it passes through or out of the enlarged flange section of the cross-bar or

T-shaped member recess, so that the cord will extend into the enlarged flange portion of the new cross-bar or T-shaped member, but no further. In one embodiment the mould has five parts.

In another, preferred embodiment, the mould has only two parts and the cord is cut at a location remote from the mould.

Preferably the cross bar or T-shaped member is formed with one of its bars extending substantially perpendicular to the parting plane of the mould.

In a preferred embodiment the above method is adapted to make an assembly of attachments according to the second aspect of the invention. Preferably this is achieved by providing the mould with a recess for moulding a spine and a plurality of cross-bars or T-shaped members attached to the spine and a plurality of recesses for moulding terminal members.

The cross-bar and spine recess thus has several cross-bar or T-shaped member portions, each respective cross-bar or T-shaped member portion of the recess is preferably positioned opposite a corresponding terminal member recess.

A plurality of cords can then be introduced, each cord being positioned between a terminal member recess and a respective cross-bar or T-shaped member portion of the spine and cross-bar or T-shaped member recess. Each cord may be stored on a respective reel and fed into the

mould as required. The terminal member recesses may each have their own liquid plastic injection ports, or alternatively they can be in fluid communication, e.g. via a recess for moulding a connecting runner which can be snapped off the assembly to leave the final product. The cords can be pulled through the mould together, once the attachments and spine have been moulded, for example, by pulling the spine or a connecting runner between the moulded terminal members. Additional apparatus may be provided to grip a portion of the attachment, spine or connecting runner and automatically pull the completed attachments from the mould whilst also pulling new lengths of cord into the mould for subsequent moulding.

In alternative embodiments, a single cord can be positioned so that it extends back and forth between the terminal member recesses and cross-bar or T-shaped member portions of the spine and cross-bar or T-shaped member recess and at least partially into said recesses. Then once the liquid plastic has been injected and solidified, the surplus connecting pieces of cord can be cut to separate the attachments if necessary.

In this alternative the mould preferably has cord support means, such as pins, at least one of which is positioned or positionable adjacent the cross-bar or T-shaped member recesses and at least another of which is positioned or positionable adjacent or preferably behind

the terminal member recesses. By "behind" it is meant that the terminal member recesses are between the spine and cross-bar or T-shaped member recess and the cord support means "behind" them. The flexible cord can then be passed between the cord support means (e.g. by winding or looping around cord support pins) so that it extends back and forth between the cross-bar or T-shaped member and terminal member recesses.

So, for example the cord may pass from a first cross-bar recess, across the mould, to a first terminal member recess, then back across the mould to a second-cross-bar or T-shaped member recess etc. Alternatively, the cord may pass between two adjacent cross bar or T-shaped member recesses before passing back across the mould to the terminal member recesses and pass between two adjacent terminal member recesses before passing back across the mould again.

In this way, the cord passes through or enters partially into the recesses, so that when the liquid plastic is injected into and solidifies in the recesses, the cord is fixed to the terminal members and the cross-bars or T-shaped members. The cord may then be cut so as to separate any terminal members which have been connected together by the cord and so as to sever any cord connection between adjacent cross-bars or T-shaped members. The cord is thus cut into several lengths each length connecting a respective terminal member and

cross-bar or T-shaped member and an assembly according to the second aspect of the invention is formed.

The cord support means may be fixed in position. Alternatively at least some of the cord support means may be movable between a first position and a second position. This provides a useful technique for positioning the cord in the desired position as it can be laid on the mould in a straight line and adjusted by movement of the cord support means.

In one embodiment a first set of cord support means is permanently fixed in position adjacent the spine and cross-bar or T-shaped member recess and a second set of cord support means is slidable in the mould between a first position adjacent the spine and cross-bar or T-shaped member recess and a second position adjacent the terminal member recesses. The flexible cord is laid on the mould such that it extends between the two sets of cord support means and the second set is then moved to the second position so that parts of the cord are kept adjacent the spine and cross-bar or T-shaped member recess by the first set of support means and parts of the cord are pulled toward the terminal member recesses by the second set of support means, the cord thus extending back and forth between the recesses as desired.

The method of the third aspect of the invention may be used to make an attachment or assembly having any of

the features described above in relation to the first and second aspects of the invention.

A fourth aspect of the invention provides apparatus for making an assembly according to the second aspect of the invention, the apparatus comprising a mould and preferably also cord support means as described above.

Further preferred features of the above aspects of the invention may be found in the claims.

Embodiments of the invention will now be described in detail, with reference to the accompanying drawings, in which:-

Figure 1 shows an attachment having a flexible cord;

Figure 2a shows an assembly comprising a plurality of attachments mounted on a spine; and

Figures 2b and 2c show alternative terminal members;

Figures 3a - 3f show steps in a first method for the manufacture of an assembly such as that shown in figure 2a;

Figures 4a - 4d show steps in a second method for the manufacture of an assembly such as that shown in figure 2a;

Figures 5a-5e show steps in a third method for the manufacture of an assembly such as that shown in figure 2a.

A first embodiment of the invention is an attachment designed for attachment to a fabric article or articles, shown in Figure 1. The attachment 1 comprises a length of flexible cord 5, one end of which is fixed to a terminal member 10 in the form of a moulded plastic ball and the other end of which is fixed to a moulded plastic T-shaped member 15. The T-shaped member 15 comprises two bars 16 and 17 which are substantially perpendicular to each other; one of the bars 17 is longer than the other and has an enlarged flange 18 at one end to which the flexible cord 5 is fixed. The rayon cord 5 is thicker than the bar 17 (i.e. it has a larger cross sectional area), but thinner than the enlarged flange 18. In this embodiment the cord extends through the terminal member such that a short length 5a extends out of the end of the terminal member; in other embodiments the cord extends only partially into the terminal member.

In an alternative embodiment the bar 17 could extend past the junction with bar 16 so as to form a cross-shaped member or cross-bar, the extension of bar 17 for connection to a spine as shown in Fig 2a. Similarly the terminal member 10 could equally well be a paddle, hook, eye, snap fit connector, cross-bar, or T-shaped member, instead of a ball.

The flexible cord 5 is formed from several fibre strands which have been twisted together to form a

string. Compared to the T-shaped member 15 the cord 5 is flexible and soft. It is also relatively limp and capable of adopting various configurations without resiliently returning to an original (e.g. straight) configuration. This has the advantage that the attachment hangs naturally from fabric articles, such as clothing, to which it is attached and is unlikely to irritate a customer trying on the clothing.

The terminal member 10 and T-shaped member 15 may be formed of any suitable plastic, e.g. nylon; the flexible cord 5 may be formed of any suitable material, e.g. rayon.

Figure 2a shows a portion of a second embodiment of the invention: an assembly comprising a elongate cylindrical plastic spine on which a plurality of attachments 1,1',1" are mounted. Figure 2a only shows one end of the assembly, the spine may have more than three attachments mounted on it. Each attachment is similar to the attachment shown in Figure 1, but has a cross-bar 15,15',15" rather than a T-shaped member. The cross-bars are releasably attached to the spine 2, such that the attachments may be severed from the spine by use of a tagging gun as is conventionally known in the art. Intermediate teeth 3 are provided on the spine, between the attachments, to assist operation of the tagging gun.

Figure 2b shows an alternative terminal member 5b, in the form of plastic, such as nylon, moulded to give the appearance of a knot. Figure 2c shows a further alternative terminal member 5c: an arrow-shaped snap-fit connector.

A first method of manufacturing the attachment assembly of Figure 2a will now be described.

A five part mould is used. The mould 20 comprises a first part 21 opposing a second part 22, a third part 23 opposing a fourth part 24 and a parting plane between the first 21 and second 22 and third 23 and fourth 24 parts as shown in Figure 3d. When these mould parts are closed, they define a recess for moulding a plurality of cross-bars attached to a spine and a plurality of recesses for moulding ball shaped terminal members. The mould is shown in cross section in Figures 3a - 3e. The cross section cuts perpendicular to the axis of the spine and so only a first recess 35 for moulding a cross-bar and a second recess 40 for moulding a ball shaped terminal member 10 can be seen in Figures 3a - 3e, however other recesses exist as shown in Figure 3f which is a partial cross-section of the mould 20 along the line A-A of Figure 3a, before the liquid plastic is injected. Figure 3f shows cross-bar recesses 35a-35d and terminal member recesses 40a-40d. The cross-bar recesses are joined by the spine recess 36 which runs perpendicular to the plane of the cross-section of

Figures 3a - 3e. The spine recess 36 is shaped for moulding a plurality of teeth 52 so that the assembly when formed can be used with a tagging gun. The fifth part of the mould 25 has an injection port 36 for supplying liquid nylon to the recesses via a channel 37. The channel 37 connects to the back end of the flange portion 135 of the cross-bar recess 35.

A flexible cord 30 (e.g. a rayon string cord) is placed in the mould such that it extends between the first and second recesses 35, 40. The cord 30 extends through or at least partially into each recess; this is important as it allows the plastic cross-bar and terminal portions to be moulded around the cord 30, providing a simple, neat way of fixing the cross-bar and terminal portion to the cord. The channel 37 connects to the back of the flange portion 135 of the cross-bar recess 35. Thus the speed and pressure of the injected plastic ensures that the cord is kept correctly positioned in the recess 35 to ensure that the plastic is moulded around the cord.

The cord 30 extends into the cross-bar recess 35, only as far as the enlarged flange portion 135 thereof, it does not extend as far as the cross part 139. Separate rayon string cords are likewise placed between the other terminal member and cross-bar recesses (see Figure 3f).

In Figures 3a and 3b the nylon has already been injected through the injection port 36 of the closed mould 20 and allowed to solidify so as to form the cross-bar 15 and the ball shaped terminal member 10. The cross-bar and terminal member have been moulded around the cord 30 and are therefore securely fixed to it. The same is true of the other cords and cross-bar and terminal member recesses (shown in the Fig 3f cross section). All the cross-bars are connected by the moulded spine 2 to which they are attached. The liquid plastic also solidifies in the channel 37 to form a connecting runner 50 which can be snapped or cut off as shown in Figure 3c once the fifth mould part 25 has been opened.

Once the nylon has solidified and the cross-bars 15, and terminal members 10 and spine 2 have been formed, and the runner so removed, the mould parts 21 - 24 are opened by separating the parts 21, 22, 23, 24 along their common parting plane, as shown in Figure 3d. The cord 30 is then pulled along in the direction from the terminal member recess to the cross-bar recess (the left to right direction in Figure 3d), until the terminal member 10, which has just been formed, is positioned between the third 23 and fourth 24 mould parts as shown in Figure 3e. The cord 30 attached to the terminal member 15 is thus pulled through the mould, so that it is in position for forming a new attachment.

The other cords and terminal members are likewise pulled through the mould, in fact all can easily be pulled through at once, to the desired position, as they are all connected via their respective cross-bars to the spine 2.

The first 21 and second 22 mould parts are then closed so as to grip the cord 30 (and the other cords shown in Figure 3f), but the third 23 and fourth 24 mould parts are left open as shown in Figure 3e, so that the cords may easily be cut. The cord 30, then extends back from the terminal portion 10 through the mould parts 21 and 22, through the enlarged flange portion 135 of the cross-bar recess and through the terminal portion recess 40. The cord 30 is then cut just below the terminal portion 10, at the point where it leaves the enlarged flange recess 135, to separate the attachment (i.e. the terminal portion 10, cross-bar 15 and the length of cord therebetween) which has just been formed, from the rest of the cord 30. The other cords (shown in Figure 3f) are likewise cut. The mould parts 23 and 24 are then closed and liquid nylon is again injected and allowed to solidify to form new attachments and a new spine. The process can be repeated as many times as necessary to make the required number of attachments assemblies.

A second method of manufacturing the attachment assembly of Figure 2a will now be described.

A two part mould is used. The mould 20 comprises a first part 21 opposing a second part 22 with a parting plane between them as shown in Figure 4b. When these mould parts are closed, they define recesses 35 for moulding a plurality of cross-bars attached to a spine and a plurality recesses for moulding arrow shaped terminal members. The second mould part includes a sloped channel 100 that allows the cord 30 to access the mould. The sloped channel 100 also helps align the cord at the correct position for moulding. Preferably, the channel is aligned with the cord running between the terminal member recess and the enlarged flange portion of the cross-bar recess such that the passage of the thread through the mould is in a straight line/path.

The mould is shown in cross section in Figures 4a, 4b and 4d. The cross section cuts perpendicular to the axis of the spine at the point where the sloped channel 100 enters the second part of the mould 22 and so only a first recess 35 for moulding a cross-bar and a second recess 40 for moulding an arrow shaped terminal member 10 can be seen in Figures 4a, 4b and 4d. In fact, only the enlarged flange portion 135 of the first recess 35 is seen in the cross-section Figures. This is because the cross part 139 of the recess 35 is in a different vertical plane to the enlarged flange portion 135 of the recess 35. This can be more clearly seen in Figure 4C. This off-setting of the cross part 139 of the recess is

to allow the cord to enter the mould (through its respective sloped channel) and then pass between the enlarged flange portion 135 of the recess 35 and the recess 40 for moulding the terminal member in a straight path. If the cross part 139 was not off-set, the path of the cord between the recesses would be distorted from a straight path and this may lead to problems in the subsequent steps of pulling the moulded attachments from the mould and drawing more cord into the mould.

The layout of the cross-bar recesses are best shown in Figure 4c which is a partial cross-section of the mould 20 along the line B-B of Figure 4a, before the liquid plastic is injected. Figure 4c shows cross-bar recesses 35a-35d and terminal member recesses 40a-40d. The cross-bar recesses are joined by the spine recess 36 which runs perpendicular to the plane of the cross-section of Figures 4a, 4b and 4d. The spine recess 36 is shaped for moulding a plurality of teeth 52 so that the assembly when formed can be used with a tagging gun.

The upper portion of the first part of the mould 21 cooperates with the lower portion of the second part of the mould 22 to define an injection port 36 for supplying liquid nylon to the recesses via a channel 37. The channel 37 connects to spine recess 36 and to the terminal member recesses 40a-40d. The terminal member recesses are joined by a second channel 37a. In

preferred embodiments, there are two injection ports, one each side of the mould.

A flexible cord 30 (e.g. a rayon string cord) is placed in the mould such that it extends in a straight line between the first and second recesses 35, 40. The cord 30 extends through or at least partially into each recess. The cord 30 extends into the cross-bar recess 35, only as far as the enlarged flange portion 135 thereof, it does not extend as far as the cross part 139. The cord exits the top side of the enlarged flange and continues in a straight line to and then through the sloped channel 100 in the second part of the mould 22 to a reel where excess cord, yet to made into attachments is stored. The cross part 139 of the recess 35 is off-set from the path of the cord to allow the cord to pass in a straight line from the enlarged flange portion 135 of the recess 35 to the sloped channel 100. Each sloped channel is vertically aligned with its respective enlarged flange portion 135 of the recess 35.

Separate rayon string cords are likewise placed between the other terminal member and cross-bar recesses (see Figure 4c). Each cord will enter the mould) via sloped channel 100. Figures 4a, 4b and 4d show only a single sloped channel 100 but a separate channel (aligned with its respective enlarged flange portion 135 of the recess 35) will be provided for each cord entering the mould. The channels assist the correct

positioning of the cord between its respective enlarged portion 135 of the recess 35 and terminal member recess. The cord runs in a straight path from the sloped channel, through the enlarged flange portion of the recess 35 and to the terminal member recess.

In Figure 4a the nylon has already been injected through the injection port 36 of the closed mould 20 and allowed to solidify so as to form the cross-bar 15 and the arrow shaped terminal member 10. The enlarged flange and terminal member have been moulded around the cord 30 and are therefore securely fixed to it. The same is true of the other cords and enlarged flange and terminal member recesses (shown in the Fig 4c cross section). All the cross-bars are connected by the moulded spine 2 to which they are attached. The liquid plastic also solidifies in the channel 37 to form a connecting runner which can be snapped or cut off at a later stage.

Once the nylon has solidified and the cross-bars 15, terminal members 10, spine 2 and runners have been formed, the mould parts 21 and 22 are opened by separating the parts along their common parting plane, as shown in Figure 4b. The attachment is then ejected from the mould by an ejector 102. Preferably, one ejector is located in the vicinity of the terminal member recess whilst another is located in the vicinity of the cross-bar recess. Such ejectors are standard in the art. The ejectors located in the vicinity of the

cross-bar recesses also assist in the correct positioning of the cord in the cross-bar recess as shown in Figure 4b. The ejector pushes the cord into horizontal alignment with the enlarged flange portion 135 of the recess 35.

Once the attachment is formed, the cord 30 is pulled along in the direction from the cross-bar recess to the terminal member recess (the right to left direction in Figure 4b), until the cross-bar 15, which has just been formed is outside the mould. The cord 30 attached to the cross-bar 15 is thus pulled into the mould through the sloped channel 100, so that it is in position for forming a new attachment. The other cords are likewise pulled into the mould through their respective sloped channels. In fact all of the moulded attachments can easily be pulled from the mould at once, with the new portions of cord being pulled to the desired position, as all of the moulded attachments are connected via their respective cross-bars to the spine 2 and also to runners formed in the channels 37 and 37a. The pulling of the moulded attachments from the mould can be carried out using gripping and pulling means 103 which may be remote from the mould. This gripping means can hold the cord taught so that new cord yet to be moulded into an attachment lies in a correct position between the necessary recesses.

The first 21 and second 22 mould parts are then closed so as to grip the cord 30 (and the other cords shown in Figure 4c) and liquid nylon is again injected and allowed to solidify to form new attachments and a new spine. The process can be repeated as many times as necessary to make the required number of attachments assemblies.

The completed attachment pulled from between the separated moulds is subsequently moved to a cutting apparatus 101 as seen in Figure 4d. It can be seen that the cords a) between the moulded attachment in the cutting apparatus, b) between the moulded attachment waiting to enter the cutting apparatus and c) of the of the moulded attachment just formed in the mould are all vertically and horizontally aligned with each other and are also vertically aligned with the sloped channel such that the cord always passes in a straight path with no deviation from a vertical plane. The cord is severed (by vertical knives in the cutting means 101) at the point where it exits the spine side of the elongated flange and also at the point where it exits the terminal member (at the side remote from the cross-bar). The cutting apparatus also severs the runners formed in the channels 37a between the terminal members and the runners between the spine and the terminal member of the attachment formed in the channels 37a. This leads to an array of the desired attachments formed on a spine.

A third method of making an assembly such as that shown in Figure 2a will now be described.

A partial cross-sectional plan view of the mould along a central parting plane of the mould is shown in Figures 5a-5d. The mould has a plurality of generally spherical recesses 81, 82, 83, 84 for moulding ball shaped terminal members and a recess 90 for moulding a spine and a plurality of cross-bars releasably attached to the spine. The recess 90 has a spine recess portion 91, intermediate teeth recess portions 92 and cross-bar recess portions 93-96. The mould is designed to form a spine having four attachments, although in alternative embodiments larger moulds capable of forming ten or more attachments could be used. The necessary modifications will be apparent to a person skilled in the art.

The terminal member recesses 81-84 are provided towards one end of the mould and the spine and cross-bar recess 90 is provided towards an opposite end of the mould. The cross-bar portions of the recess 90 extend towards the terminal member recesses 81-84.

The mould further comprises a plurality of cord support means, in the form of pins 100-106. These pins are mounted in the first part 201 of the mould and received in corresponding holes or slots in the second 202 (upper) part of the mould, these pin receiving slots and/or holes being isolated from the injection ports, so

that they do not become clogged up with plastic during the injection procedure.

The pins can be divided into a first set, comprising pins 100, 102, 103, 105 and 106 and a second set comprising pins 101 and 104. In the starting configuration shown in Figure 5a, the pins in the first set are aligned with each other along a line substantially parallel to the spine portion 91 of the recess 90. The pins in the second set 101 and 104 are also aligned with each other along a line substantially parallel to the spine portion 91 of the recess 90. The pins in the first set are fixed in place near the ends of the cross-bar recess portions 93, 94, 95 and 96 of the recess 90. The pins in the second set are slidable from a first position adjacent the cross-bar recess portions 93-96 and closer to the spine recess 91 than the pins in the first set, to a second position behind the terminal member recesses 81-84, as shown in Figure 5c (Figure 5b shows an intermediate position as the pins are being slid between their first and second positions).

In the starting configuration, shown in Figure 5a, the pins in the first set are fixed in place near the cross-bar portions of the recess 90 and the pins in the second set 101 and 104 are in their first position adjacent the cross-bar recess portions. In general there is either one pin from the second set, or two pins from

the first set between each pair of cross-bar portions of the recess 90. A flexible cord 110 is fed into the mould so that it extends between the pins of the first and second sets and in a straight line approximately parallel to the spine portion 91 of the recess 90.

The pins in the second set 101 and 104 (which may be mounted in grooves in the mould) are then slid to their second position, adjacent the terminal member recesses as shown in Figure 5c. The arrows in Figure 5b show the direction of movement of the pins.

The pin 101 has two parts 101a and 101b which separate in the second position to be behind terminal portion recesses 81 and 82 respectively. The pin 104 also has two parts 104a and 104b which separate in the is in its second position to fall behind terminal member recesses 83 and 84 respectively. The pin parts 101a, 101b, 104a and 104b are then temporarily locked into their second positions, shown in Figure 5c.

Liquid plastic is then injected into the terminal member 81-84 and cross-bar and spine recesses 90, through an injection port (which is not shown in Figures 5a-5d). The plastic is allowed to solidify so as to form terminal members 121-124 and a spine 130 with releasably attached cross-bars 131-134 and intermediate teeth 135 disposed between the cross-bars as shown in Figure 5d. As should be evident, the spine 130, cross-bars 131-134 and intermediate teeth 138 are integrally formed. The

connection between each cross-bar and the spine being weak enough that it can be cut or severed by a tagging gun. The liquid plastic is injected through a third mould part 203 having an injection port 36 and channel 37 for delivering the liquid plastic to the recesses in the first 201 and second 202 mould parts; the channel contacts (is in fluid communication with) the spine portion 91 of the cross-bar and spine recess 90. As in the first method, plastic which solidifies in the channel 37 can be removed.

Surplus pieces of cord and lengths of cord connecting the attachments can then be cut. Thus surplus cord is cut at locations C and E adjacent the outermost cross-bars and unwanted cord connections are cut at locations A and B in the region of the pins 101 and 104 between adjacent terminal members and at location D between two of the cross-bar portions 132 and 133 which have two cord supporting pins 102 and 103 between them.

The skilled man will appreciate that alterations to and variations of the above embodiments are possible while still keeping within the scope of the appended claims.